METHODS AND DEVICES FOR CONTROLLING FLOW AND PARTICLE FLUIDIZATION IN A FUEL CELL

ABSTRACT OF THE INVENTION

Improved fuel cell systems comprise a fuel delivery system having a fluidization apparatus and a fluidization pump for creating an electrolyte flow suitable for fluidizing at least a portion of the fuel particles located within the fluidization apparatus. Due to the presence of the fluidization pump and the fuel delivery pump, the degree of fluidization of the fuel particles can be controlled independently of the overall electrolyte flow rate provided to the cell stacks. In other words, the mass flow rate of fuel particles through the fuel cell can be varied independently from the total flow rate through the fuel cell system. The fluidization of fuel particles can facilitate suitable mixing of fuel particles and electrolyte and can prevent fuel particle agglomeration, which can clog the fuel cell piping system. In some embodiments, a splitter element can be positioned within the container to divide the fuel and electrolyte flow exiting the container into multiple flows, which prevents the blockage of one pathway from completely starving the cell stacks of fuel and electrolyte.